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GB 1175684

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F2M

B7B

Selected US specifications from IPC sub-class F16B

(54) Plungers

(57) A plunger (5) is adapted for detachably holding rigidly together two lengths of tubing (1 and 3). The plunger (5) comprises two part-cylindrical members (8) adapted to fit face to face to form a cylinder of diameter just less than the internal diameter of the tubing so that it can slide easily within said tubing. The members (8) are held together in said cylindrical disposition by resilient means (10). The members (8) may be forced apart against the resilient holding means by such means as a bolt (11) until said plunger forms a tight fit against sides of said tubing. It thereby fixedly engages the two lengths of tubing together. The tubing (1), which may form a handle 2 of a wheelchair or pram, may be pivotted (4) to the tubing (3).

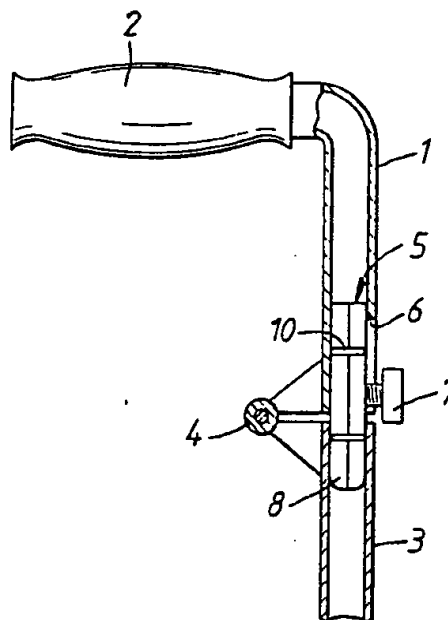


Fig. 1.

The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy. The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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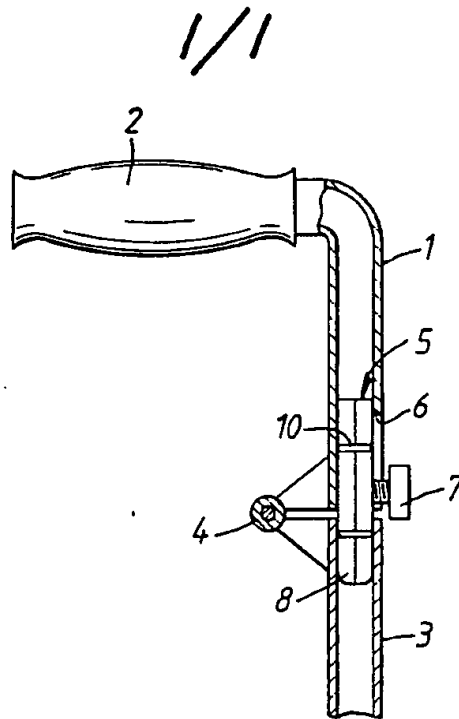


FIG. 1.

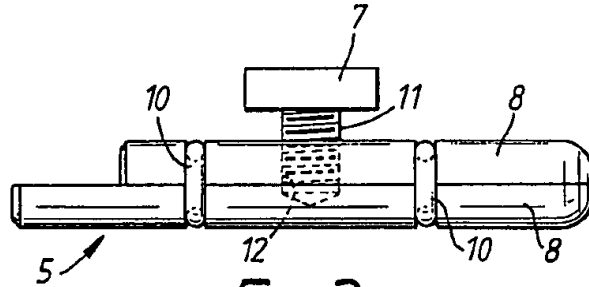


FIG. 2.

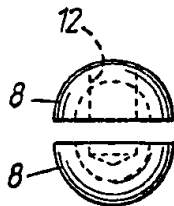


FIG. 3.

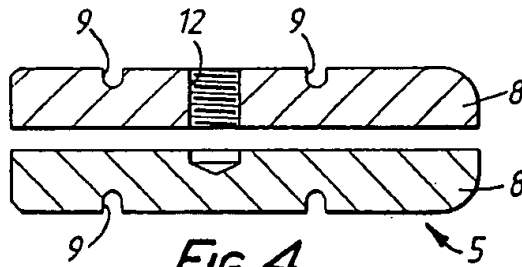


FIG. 4.

SPECIFICATION

Plungers

5 The present invention relates to plungers, particularly of the type used to connect together two lengths of tubing.

In general, such plungers occupy substantially the entire internal area of the tubing and can be moved
10 from a position where they bridge the join to a second position where the plunger is substantially entirely within one length of tubing. In this second position the two lengths of tubing can then be separated or bent. It is generally preferred that the
15 length of tubing which accepts the plunger is, in use, uppermost so that a positive action is required to separate the two lengths. When they are subsequently placed in alignment, the plunger falls under the influence of gravity to connect them
20 together.

Plungers of this type are commonly used in folding articles such as wheelchairs or prams which require to be folded for ease of transport. In the case of wheelchairs, it may be necessary to have parts which
25 fold easily, when the occupier wishes to take part in a sporting activity or when he requires to be lifted from behind. One part which commonly folds in wheelchairs is a back rest to which is attached the handles by which the wheelchair is pushed. The
30 invention will be described with particular reference to this utilisation although, as stated above, other uses are possible.

As stated above, it is common to hinge together two lengths of tubing to form a back frame for a
35 wheelchair. The handles are attached to the upper of these lengths of tubing. Great force may have to be transmitted through such a joint, for example, when the wheelchair is tilted backwards to be lifted up a kerb. Accordingly, the joint must be strong. Clearly,
40 in order to be easily operable, the plunger must be an easy sliding fit within the tubing so that it can be disengaged undue effort. However, it has been found that the forces exerted on this joint cause the plunger to damage the lower section of the tubing at
45 a point opposite the hinge. This is generally thought to be because the plunger is a loose fit and because the hinges are so arranged that the usual force on the handles, downwardly, causes the plunger to knock against the internal surface of the lower tube and
50 eventually cause bulging and possibly fracture at that point.

It is the object of the present invention to provide a plunger which will overcome the above disadvantage and which may have other useful
55 applications.

According to the present invention there is provided a plunger for detachably holding rigidly together two lengths of tubing, the plunger comprising two part-cylindrical members adapted to
60 fit face to face to form a cylinder of diameter just less than the internal diameter of the tubing to be able to slide easily within said tubing, resilient means to hold said members in said cylindrical disposition, and means to force apart said members against the
65 resilient holding means until said plunger forms a

tight fit against sides of said tubing.

Preferably each of the members comprises an axially extending half of the cylinder.

The resilient holding means may comprise one or
70 more elastomeric rings extending in a respective one or more grooves around an outer circumference of the members when they are assembled together.

One end of each member may be so tapered that the assembled plunger has a substantially
75 hemispherical end.

The forcing means may be a screw threaded bolt extending through a correspondingly screw threaded through-hole in one member to engage the contiguous surface of the other.

80 Preferably said surface is provided with a blind hole aligned with the through hole.

The bolt may extend through a slot in the tubing wall to be turned for separating the members. The bolt may also constitute means by which the plunger
85 is caused to slide within the tubing at least in one direction.

The lengths of tubing advantageously are hinged together and may comprise part of a frame of a wheelchair, pram or other folding article.

90 An embodiment of the present invention will now be more particularly described by way of example and with reference to the accompanying drawings, in which:

Figure 1 shows schematically part of a wheelchair frame including a plunger embodying the invention;
95 *Figure 2* is a side elevation of a plunger embodying the invention;

Figure 3 is a view from one end of a plunger embodying the invention in separated condition;
100 and

Figure 4 is a cross-sectional view of a plunger in separated condition.

Referring now to the drawings, and particularly *Figure 1*, there is shown a portion of a backframe for a wheelchair comprising a handle section 1, bent at one end to receive handles 2 and a main section 3. The two sections are hinged together by means of hinge 4. In order to hold the two sections rigidly together there is provided a plunger 5 able to slide within the tubing. The upper section 1 has a slot 6 in one wall through which a handle 7 of the plunger protrudes. By this means, the plunger 5 can be lifted upwardly so that it is entirely within the upper section 1, whereafter the two sections can be
115 hingedly separated.

When the sections are again aligned, the plunger 5 should slide down under the force of gravity to re-engage the sections. For this purpose, the lower end of the plunger 5 is generally rounded to aid locating itself within the lower section 3.
120

Referring now to the more detailed view of the plunger shown in *Figures 2 to 4*, it can be seen that the plunger comprises a cylinder formed of two longitudinal halves. These longitudinal members 8
125 may be the same length or different, for example 55 or 75 millimetres. Each member 8 has two grooves 9 extending around its curved circumferential surface. The grooves 9 are each dimensioned to accommodate an O-ring 10 of resilient material such as nitrile
130 rubber, for example 1.78 millimetres thick and 17.2

millimetres outside diameter. Once the two halves of the plunger are assembled together, they may be held in such condition by means of these O-rings 10.

The handle 7 by means of which the plunger is moved upwardly in the tubing, is connected to the plunger 5 by means of a screw threaded bolt 11 engaging in a correspondingly screw threaded hole 12 in one of the members 8. The other member 8 has a corresponding blind hole on its flat surface, against which the bolt 11 may bear.

In order to use the plunger embodying the invention, it is first slid downwardly, either by gravity or by use of the handle 7 until it is in a locking disposition. The bolt 11 is then turned so that the one member 8 which is in screw threaded engagement therewith will move away from the other member 8 against which the bolt bears. The O-rings 10 will expand to allow this moving apart but are sufficiently resilient that once the bolt 11 is unscrewed, they will act to draw together the two members 8. The expansion of the plunger causes each member 8 to contact a corresponding portion of the internal wall of the tubing and be fixedly held there until the bolt 11 is unscrewed. Since the plunger is now fixedly engaged the two sections of tubing are more securely connected and there is less danger of damage to one section because of repeated pressure by an end of a comparatively loose fitting plunger. Use of a plunger embodying the invention also enables a single plunger to be used for tubing of quite different internal diameters.

The preferred material for the plunger is mild steel or SG iron, finished with a bright zinc plating. The plunger may easily be manufactured by turning a bar of material, cutting in half, and forming the blind hole in each half, one of which is later drilled through and tapped. Assembly is quite straight forward.

CLAIMS

1. A plunger for detachably holding rigidly together two lengths of tubing, the plunger comprising two part-cylindrical members adapted to fit face to face to form a cylinder of diameter just less than the internal diameter of the tubing to be able to slide easily within said tubing, resilient means to hold said members in said cylindrical disposition, and means to force apart said members against the resilient holding means until said plunger forms a tight fit against sides of said tubing.
2. A plunger as claimed in claim 1, wherein each of the members comprises an axially extending half of the cylinder.
3. A plunger as claimed in either claim 1 or claim 2, wherein the resilient holding means comprises one or more elastomeric rings extending in a respective one or more grooves around an outer circumference of the members when they are assembled together.
4. A plunger as claimed in any one of the preceding claims, wherein one end of each member is so tapered that the assembled plunger has a substantially hemispherical end.
5. A plunger as claimed in any one of the preceding claims, wherein the forcing means is a

screw-threaded bolt extending through a correspondingly screw-threaded through-hole in one member to bear against the contiguous surface of the other.

6. A plunger as claimed in claim 5, wherein said contiguous surface is provided with a blind hole aligned with the through hole.

7. A plunger as claimed in either claim 5 or claim 6, wherein the bolt extends through a slot in the tubing wall to be turned for separating the members.

8. A plunger as claimed in claim 7, wherein the bolt constitutes means by which the plunger is caused to slide within the tubing at least in one direction.

9. A plunger as claimed in any one of the preceding claims, wherein the lengths of tubing are hinged together and comprise part of a frame of a wheel chair, pram or other folding article.

10. A plunger for detachably holding rigidly together two lengths of tubing substantially as herein described with reference to the accompanying drawings.

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